Engineering Systems

Creating Large Format (6' x 6') Wall Displays Using High Resolution LAR-IAC Digital Ortho Photography: Challenges Faced and Outcomes

The City of Downey contracted with Nag Inc. the production of seventeen large format 6' x 6' Wall displays of the 4" resolution digital ortho-photography of their jurisdiction obtained from LAR-IAC. 190 tiles were provided requiring the management of 760 files for a total of over 40 gigabytes of data.

The City had struggled with creating the plots in-house for some time before the decision was made to contract the work to a vendor, and the City wished to be involved in the process every step of the way. Only four tiles were initially provided for our test and demonstration of our capability to overcome the difficulties encountered. This limitation proved to be counterproductive as every time we progressed a step in the process, we encountered the next problem when we returned to the City to apply what we had learnt to the complete dataset. After we had completed several iterations of this, the City agreed to have us sign the standard agreement, and provide us the complete dataset on a 500-gigabyte external drive we purchased for the project.

The City had initially specified use of ER-Mapper, a Leica software designed specifically for management of digital aerial photography. After several weeks of effort, we agreed that ESRI's ArcGIS was more appropriate to manage several aspects of the product that the City was requesting. Our initial plots were produced directly from ArcGIS, but proved woefully inadequate in terms of graphic quality. Stepping up pixel resolution dramatically increased file sizes, locking up our computers for days without completing the process. The map scale of 1 inch = 400 feet requires a pixel resolution to 1,200 dots per inch for complete representation of the original pixel size of 4 inches. It was only by reducing the output resolution to 150 dpi that we succeeded in producing the first set of plots. Doubling the output pixel resolution increased file sizes geometrically by four times, bringing the computer to a grinding halt.

One weekend, I was taking time out, waiting for a process to complete, to work in the yard cleaning up the brush. Roger Sampson, our neighbor, was in his yard scheming on ways to get rid of the ground squirrels that have a taste for our vegetables. Every one we trap is taken for a 5-mile ride up Mount Baldy to be released into what has become a haven for Nag and Sampson family critters. During our animated discussion, I happened to mention my frustration with my work, and I learnt of Roger's profession. He prints large format decals for trucks, and was familiar with some of the problems that I was facing. I took up his offer to help. He suggested utilizing his graphics

software to print the photographs on his large-format 1200 dpi inkjet printer using aqueous inks.

Unfortunately, there was no way to efficiently geo-reference files within his graphic environment. The 190 tiles would be a nightmare to match up pixel-to-pixel. We decided to split up the work between our PC-based system and his Mac-based platform, optimizing each to its most effective capacity. We created the overlays of labels, title block, scale bar, and north arrow to produce a tiff format print output. It was then that we discovered that both our systems had a strange limit. Most of our system utilities refused to function when file sizes crossed the 2+ gigabyte limit. I believe that this has something to do with the 32-bit configuration of our respective RAMs, since Roger appeared to succeed in overcoming this constraint after he upgraded to a 64-bit machine. To bring tiff output file sizes down, we created a grid of four 3' x 3' tiles to cover the jurisdiction, succeeding in ramping up the output pixel resolution to 400 dpi, which was acceptable to the City.

Inspecting the first sample we produced, the City requested a 41-degree rotation of the image for an orthogonal projection of their streets. Back to the drawing board again, we re-oriented all annotation and title block information. It was then that we discovered that the ESRI software was incapable of accurately depicting pixel resolution after the files were rotated. The output had a feathered, dithering effect along feature edges that compromised the final image. We resolved this issue by using Sampson's graphic medium to rotate the images. This required us to generate a 41-degree oriented 3' x 3' grid along within which each tile output was generated. Tics were inserted at each corner, fine enough not to be visible to the naked eye, but sufficient to serve as a guide for the graphic manipulations of seamless joining, rotation, and trimming of the final image.

The images were ripped with a 16-bit color raster imaging processor, printed on Kodak premium matt photo paper, layered with a 3 mm satin lamination with ultraviolet protection, and mounted on ½-inch Gator board.

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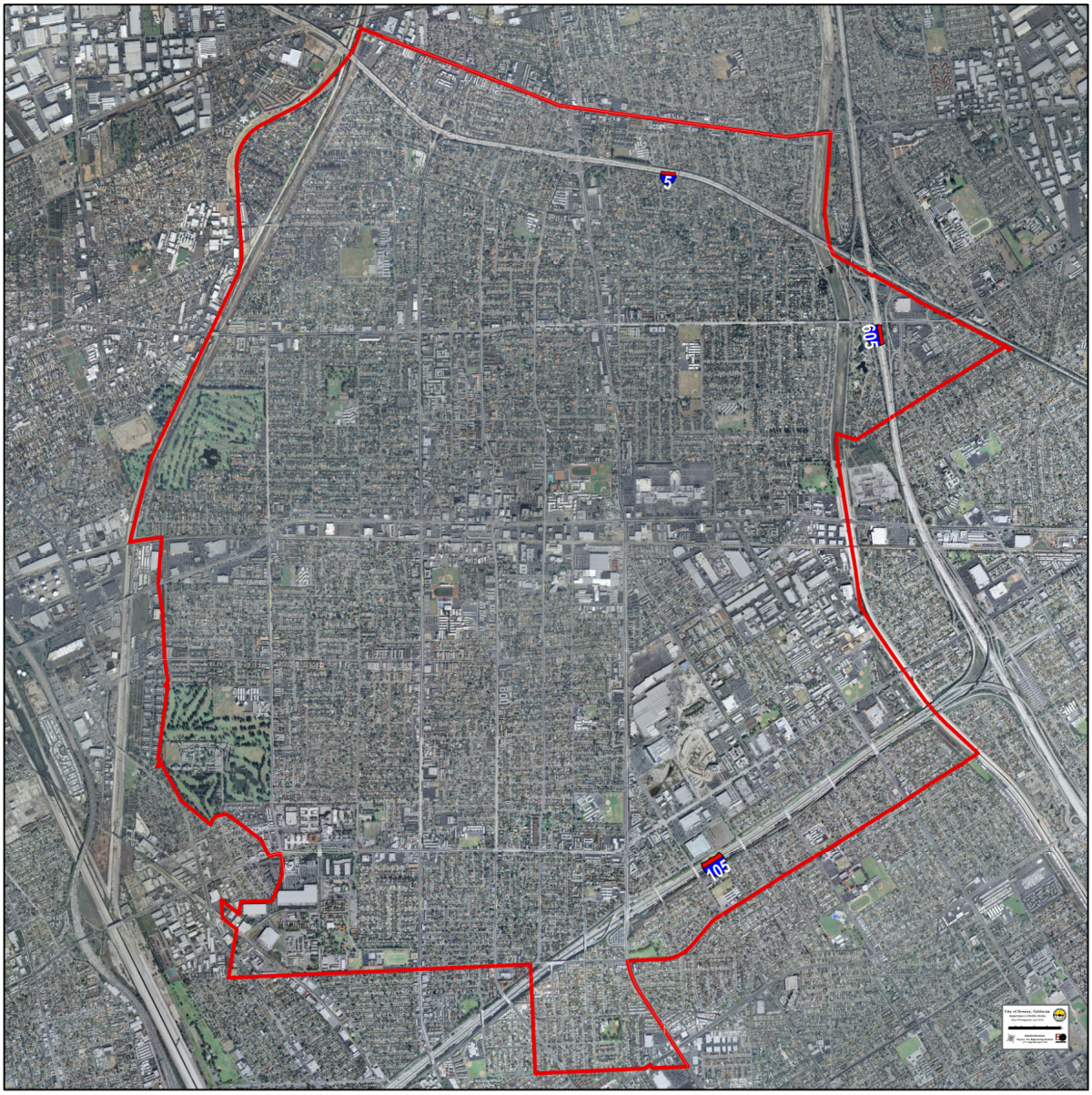

6' x 6' Wall Display

4" Resolution Aerial Imagery

City of Downey, California

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March 29, 2008

LAR-IAC High Resolution Digital Ortho-Photography Applications

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Client: City of Downey, California

Nag Inc.